

REMARKS

1. In response to the Office Action mailed October 10, 2006, Applicant respectfully requests reconsideration. Claims 1-26 were last presented for examination. Claims 1-26 were rejected in the outstanding Office Action. By the foregoing Amendments, no claims have been amended, canceled or added. Thus, upon entry of this paper, claims 1-26 will remain pending in this application. Of these twenty-six (26) claims, four (4) claims (claims 1, 10, 17 and 22) are independent. Based on the above Amendments and following Remarks, Applicant respectfully requests that all outstanding objections and rejections be reconsidered, and that they be withdrawn.

Art of Record

2. Applicant acknowledges receipt of form PTO-892 identifying additional references made of record by the Examiner.

Drawings

3. Applicant notes with appreciation the Examiner's indication that the drawings filed on April 22, 2005 have been accepted as formal drawings.

Claim Rejections

4. Independent claim 1 has been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,778,427 to Hagersten, *et al.* (hereinafter, "Hagersten") and U.S. Patent No. 5,497,477 to Trull (hereinafter, "Trull"). Also, independent claims 10, 17 and 22 and dependent claims 3-9, 11-16, 18-21 and 23-26 have been rejected under U.S.C. §103(a) as being unpatentable over Hagersten, Trull and U.S. Patent No. 6,748,492 to Rowlands, *et al.* (hereinafter, "Rowlands"). Based on the above Amendments and following Remarks, Applicant respectfully requests that these rejections be reconsidered, and that they be withdrawn.

5. Independent claim 1 recites "[a] method for storing replacement data in a multi-way associative cache comprising at least one cache set, the method comprising: ... searching a cache set in accordance with a segment search sequence for a segment currently

comprising a way which has not yet been accessed during a current cycle of the segment search sequence; [and] searching the current segment in accordance with a way search sequence for a way which has not yet been accessed during a current way search cycle;” (*See*, Applicant’s claim 1, above.)

6. In rejecting claim 1, the Examiner recognized that Hagersten, the primary reference relied on by the Examiner, fails to disclose the limitation of claim 1 regarding searching a cache set in accordance with a segment search sequence, nor the limitation of claim 1 regarding searching the current segment in accordance with a way search sequence. The Examiner relies on Trull for allegedly curing these defects of Hagersten. Applicant respectfully submits that, for the reasons set out below, the Examiner’s reliance on Trull is misplaced.

7. Trull is directed to a system for selecting in which slot of a memory cache data will be inserted. (*See*, Trull at Abstract.) The system of Trull monitors the access history of a cache slot using a Boolean variable named “used recently.” (*See*, Trull at col. 23 lns. 12-14.) A slot is marked as “used” when it is accessed. (*See*, Trull at col. 23 lns. 14-15.) When new data is to be inserted into a cache, the system of Trull selects a slot which has not been marked as “used.” (*See*, Trull at col. 23 lns. 15-18.) If no such slot exists, all slots are marked as not recently used, and the system of Trull selects one such slot. (*See*, Trull at col. 23 lns. 18-20.) Thus, the system of Trull merely discloses a single searching technique for searching for an available cache slot. Trull does not (and cannot) teach or suggest the limitation of “searching the current segment in accordance with a way search sequence” as well as the limitation of “searching a cache set in accordance with a segment search sequence...” For at least these reasons, Applicant respectfully submits that the rejection of claim 1 based on Hagersten and Trull is improper and should be withdrawn.

8. Independent claim 10 recites, in part, “selecting, when no invalidated way is in the cache set, a current segment of a segment search sequence for an available way; and searching the current segment in accordance with a way search sequence, for a next way not yet accessed during a current cycle of the way search sequence.” (*See*, Claim 10, above.) Applicant respectfully submits that for reasons similar to those noted above, neither Hagersten nor Tull, whether taken alone or in combination, teach or suggest both a segment search sequence and a way search sequence as claimed. Applicant further respectfully submits that Rowland does not cure the above noted defects of Hagersten and

Trull. Applicant accordingly respectfully requests that the Examiner reconsider and withdraw the rejection of claim 10 for at least this reason.

9. Independent claim 17 recites, in part, “cache controller ... comprising replacement logic that ...searches a cache set in accordance with a segment search sequence for a segment comprising a way which has not yet been accessed during a current cycle of the segment search sequence, and searches each segment in accordance with a way search sequence for a way which has not yet been accessed during a current way search cycle;” (See, Claim 17, above.) Applicant respectfully submits that for at least similar reasons to those discussed above neither Hagersten nor Tull, whether taken alone or in combination, teach or suggest both a segment search sequence and a way search sequence as claimed. Applicant further respectfully submits that Rowland does not cure the above noted defects of Hagersten and Trull. Applicant accordingly respectfully request that the Examiner reconsider and withdraw the rejection of claim 17 for at least this reason.

10. Independent claim 22 recites, in part, “means for storing, in response to a cache miss, replacement data in a way, if available, that contains invalidated data, and if not available, searches a cache set in accordance with a segment search sequence for a segment comprising a way which has not yet been accessed during a current cycle of the segment search sequence, and searches each segment in accordance with a way search sequence for a way which has not yet been accessed during a current way search cycle;” (See, Claim 22, above.) Applicant respectfully submits that reasons similar to those noted above neither Hagersten nor Tull, whether taken alone or in combination, teach or suggest both a segment search sequence and a way search sequence as claimed. Applicant further respectfully submits that Rowland does not cure the above noted defects of Hagersten and Trull. Applicant accordingly respectfully requests that the Examiner reconsider and withdraw the rejection of claim 22.

***The Examiner has Failed to Provide Evidence of a Proper Motivation
to Combine The References As Proposed in the Office Action***

11. The §103 rejections are *prima facie* improper because they provide no appropriate basis for combining Hagerstem and Tull. As set forth in the Manual of Patent Examining Procedure (MPEP) at § 706.02(j), “To establish a *prima facie* case of obviousness . . . ***there must be some suggestion or motivation***, either in the references themselves or in the

knowledge generally available to one of ordinary skill in the art, to modify the reference or *to combine reference teachings* (emphasis added)” *In re Vaeck*, 947 F.2d. 488, 20 USPQ2d 1438 (Fed. Cir. 1991).” Further, as held by the Federal Circuit in *In re Lee*, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002), *specific reasons must be shown in the art suggesting a combination of references in the manner claimed*. (See also *In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000) (“[P]articular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed.”); *Also see, In re Rouffet*, 149 F.3d 1350, 1359, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998) (“[E]ven when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill that suggests the claimed combination.”)).

12. The Office Action attempts to justify combining Hagerstem with Trull based on the following conclusory statement:

It would have been obvious to a person of ordinary skill at the time of the invention to combine Hagerstem and Trull to include searching for a ways or ways that have not been accessed because the cache contains a relatively small amount of memory, fills up quickly, and therefore copying an entry to the cache generally requires replacing another entry, and to help maximize performance, entries which are not being frequently used should be selected for replacement (col. 1, lines 27-32), as taught by Trull. (See, Office Action at pg. 4.)

13. The above quoted conclusory statement merely provides a motivation for using the system of Trull. It does not, however, provide any motivation regarding why someone looking at the system of Hagerstem might be motivated to use the system of Trull. Further, the system of Hagerstem discloses its own mechanism for allegedly selecting a way of a multi-way associate cache. (See, Hagerstem at Abstract.) Thus, the Examiner has failed to provide adequate evidence of why one of the skill in the art might be motivated to combine Hagerstem with Trull in the manner claimed.

14. As held by the Federal Circuit in *In re Lee*, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002), specific reasons must be shown in the art suggesting a combination of references in the manner claimed. (See also *In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000) (“[P]articular findings must be made as to the reason the skilled artisan,

with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed.”); *Also see, In re Rouffet*, 149 F.3d 1350, 1359, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998) (“[E]ven when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill that suggests the claimed combination.”)).

15. As such, because the Office Action has failed to provide evidence of a motivation to combine Hagerstem and Trull, Applicant respectfully requests that the Examiner reconsider and withdraw the rejections under §103 for at least this additional reason.

16. Similarly, the Examiner’s alleged motivation for combining Hagerstem and Trull with yet a third reference, Rowland, in rejecting certain dependent claims (*e.g.* dependent claim 7) is likewise inadequate. Particularly, the Examiner has merely cited to a portion of Rowland that describes a searching technique. This cited portion does not provide any motivation for using this technique and the statement in the Office Action reciting “this would help ensure all ways of the selected index and all indexes have been processed” does not appear in this cited portion of Rowland. (*See*, Office Action at pg. 5 citing to Rowland at col. 17 lines 36-38.) As such, for at least the reason that the Examiner has not identified any teaching providing this alleged motivation, the alleged motivation to combine is inadequate for at least this reason. Further, even if the cited portion did include such a recitation, the alleged motivation would still be inadequate because it merely provides an alleged motivation for using the searching technique of Rowland, but does not explain why one of skill in the art might be motivated to use such a searching technique in the system of Hagerstem in light of the teaching in Hagerstem of its own searching technique. Likewise, such a motivation would not explain why one of skill in the art would further combine such a searching technique of Rowland with Trull.

17. As such, because the Office Action has failed to provide evidence of a motivation to combine Hagerstem, Trull, and Rowland, Applicant respectfully requests that the Examiner reconsider and withdraw the rejections under §103 for at least this additional reason.

Dependent Claims

18. The dependent claims incorporate all of the subject matter of their respective independent claims and add additional subject matter which makes them *a fortiori*

independently patentable over the art of record. Accordingly, Applicant respectfully requests that the outstanding rejections of the dependent claims be reconsidered and withdrawn.

19. Applicant further respectfully submits that the rejections of dependent claim 9 is improper. Particularly, claim 9 recites, in part, “prior to the searching of the cache set, determining whether a way of the cache set contains invalidated data; and storing the replacement data in the way containing the invalidated data.” In rejecting claim 9, the Examiner only alleged that the prior art discloses “storing the replacement data in the way containing the invalidated data.” Without commenting on the propriety of the rejection of this limitation, Applicant notes that the Examiner identified no disclosure in any prior art reference for allegedly teaching “prior to the searching of the cache set, determining whether a way of the cache set contains invalidated data.” As such, Applicant respectfully submits that the rejection of claim 9 is improper for at least this reason.

20. Additionally, Applicant respectfully submits that the rejection of dependent claim 2 is improper and should be withdrawn for at least the following additional reason. Dependent claim 2 recites, in part, “wherein a next sequential segment of the segment search sequence is considered when a segment currently being considered to receive replacement data is determined to not contain a way which has not yet been accessed during the current segment search cycle.” In rejecting claim 2, the Examiner recognized that neither Hagersten nor Trull teach this limitation of claim 2. Instead the Examiner relied on Rowlands for allegedly teaching this limitation.

21. In rejecting claim 2, the Examiner relied on col. 14 lines 34-36 and col. 17 lines 32-35 of Rowland for allegedly disclosing a replacement circuit that changes state for each access of a cach, irrespective of whether or not the access hits or misses, wherein a consecutive way is selected as the selected way, and steps are repeated for the selected index and selected way. (*See*, Office Action at 5.) However, as noted above, dependent claim 2 recites, in part, “when a segment currently being considered to receive replacement data is determined to not contain a way which has not yet been accessed during the current segment search cycle.” The Examiner, however, has identified no disclosure in Rowland, nor any of the other cited references for allegedly disclosing this. Moreover, the cited portions of Rowland do not disclose this. Particularly, the cited portions of Rowland merely disclose a process involving selecting the next consecutive way. No determination


is made regarding when a segment is determined to not contain a way which has not yet been accessed. As such, Applicant respectfully submits that the rejection of dependent claim 2 is improper and should be withdrawn.

22. Applicant further respectfully submits that the rejections of dependent claims 18 and 23 are likewise improper for at least similar reasons to those discussed above with reference to dependent claim 2.

Conclusion

23. In view of the foregoing, this application should be in condition for allowance. A notice to this effect is respectfully requested.

Respectfully submitted,



Michael G. Verga
Reg. No. 39,410

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